



**Marked-Up Version Of Amendments Submitted With
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GROUP 3600

In the Claims:

5214. (amended) A method of treating a coal formation in situ, comprising:

- ~~providing heat from one or more heat sources to at least a portion of the formation;~~
- allowing ~~the~~ heat to transfer from ~~the one or more~~ heat sources to a part of the formation such that the heat from the ~~one or more~~ heat sources pyrolyzes ~~at least a portion of some~~ hydrocarbon material ~~within~~ the part of the formation;
- producing pyrolysis products from the formation;
- heating a first ~~portion~~ section of the part ~~of a formation~~ with one or more of the heat sources to a temperature sufficient to allow generation of synthesis gas;
- providing a first synthesis gas generating fluid to the first ~~section~~ portion to generate a first synthesis gas;
- removing a portion of the first synthesis gas from the formation;
- heating a second section of the part ~~portion of a formation~~ with one more of the heat sources to a temperature sufficient to allow generation of synthesis gas having a H₂ to CO ratio greater than a H₂ to CO ratio of the first synthesis gas;
- providing a second synthesis gas generating ~~component~~ fluid to the second ~~section~~ portion to generate a second synthesis gas;
- removing a portion of the second synthesis gas from the formation; and
- blending a portion of the first synthesis gas with a portion of the second synthesis gas to produce a blended synthesis gas having a selected H₂ to CO ratio.

5215. (amended) The method of claim 5214, wherein ~~the one or more heat sources comprise at least two heat sources, and wherein~~ superposition of heat from at least ~~the two~~ of the heat sources pyrolyzes at least some hydrocarbons ~~within~~ the part of the formation.

5216. (amended) The method of claim 5214, wherein the first synthesis gas generating fluid and the second synthesis gas generating fluid comprise ~~the same component~~ carbon dioxide.

5217. (amended) The method of claim 5214, further comprising controlling the temperature in the first ~~section~~portion to control a composition of the first synthesis gas.

5218. (amended) The method of claim 5214, further comprising controlling the temperature in the second ~~section~~portion to control a composition of the second synthesis gas.

5227. (amended) The method of claim 5214, further comprising providing at least a portion of the produced blended synthesis gas to a methanol-synthesis process to produce methanol.

5228. (amended) The method of claim 5214, further comprising providing at least a portion of the produced blended synthesis gas to a gasoline-synthesis process to produce gasoline.

5229. (amended) The method of claim 5214, wherein removing a portion of the second synthesis gas comprises withdrawing second synthesis gas through a production well, wherein a temperature of the production well adjacent to a ~~second-synthesis-gas~~ production zone of the second synthesis gas is maintained at a substantially constant temperature ~~configured to produce second-synthesis-gas having~~ such that the H₂ to CO ratio of the second synthesis gas is greater than the H₂ to CO ratio of the first synthesis gas.

5230. (amended) The method of claim 5214, wherein the first synthesis gas producing fluid comprises CO₂ and wherein the temperature of the first ~~portion~~section is at a temperature that will result in conversion of CO₂ and carbon from the first ~~portion~~section to CO to generate a CO rich first synthesis gas.

5231. (amended) The method of claim 5214, wherein the second synthesis gas producing fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons react ~~within~~in the formation to increase a H₂ concentration ~~within~~in the produced second synthesis gas.

5233. (amended) The method of claim 5214, further comprising removing an excess of first synthesis gas from the first ~~portion~~ section to have an excess of CO, subjecting the first synthesis gas to a shift reaction to reduce an amount of CO and increase an amount of H₂ before blending the first synthesis gas with the second synthesis gas.

5237. (amended) The method of claim 5214, further comprising generating electricity from the blended synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell, and storing a portion of the separated carbon dioxide ~~within~~ in a spent ~~portion~~ section of the formation.

5239. (amended) The method of claim 5214, ~~further comprising~~ wherein allowing the heat to transfer from the ~~one or more~~ heat sources to the part of the formation ~~to substantially uniformly increase~~ increases a permeability of a majority of the part of the formation such that the permeability of the majority of the part is substantially uniform.

5240. (amended) The method of claim 5214, ~~further comprising controlling~~ wherein allowing the heat to transfer from the one or more heat sources increases a permeability of a majority of the part to to produce a permeability within the part of the formation of greater than about 100 millidarcy.

5241. (amended) The method of claim 5214, further comprising heating ~~at least the portion of the part of the formation~~ the first section when providing the first synthesis gas generating fluid to inhibit temperature decrease ~~within~~ in the first section ~~part of the formation~~ during synthesis gas generation.

5242. (amended) The method of claim 5214, wherein the temperature sufficient to allow synthesis gas generation is ~~within~~ in a range from approximately 400 °C to approximately 1200 °C.

5243. (amended) The method of claim 5214, wherein heating the first section ~~a portion of the part of the formation to a~~ the temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more of the heat sources with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the zones to temperatures sufficient to support reaction of hydrocarbon material ~~within~~ the zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material ~~within~~ the zones to produce heat in the zones; and

transferring heat from the zones to the first section~~part of the formation~~.

5244. (amended) The method of claim 5214, wherein heating the second ~~portion~~section of the ~~part of the formation to a~~the temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more of the heat sources with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the zones to temperatures sufficient to support reaction of hydrocarbon material ~~within~~ the zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material ~~within~~ the zones to produce heat in the zones; and

transferring heat from the zones to the second section~~part of the formation~~.

5245. (amended) The method of claim 5214, wherein heating the first ~~portion~~section of the ~~part of the formation to a~~the temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid ~~into~~to the formation through a wellbore;

transporting the oxidizing fluid substantially by convection ~~into~~to the first section~~portion~~ of the ~~part of the formation~~, wherein the first ~~portion~~section of the ~~part of the formation~~ is at a temperature sufficient to support an oxidation reaction with the oxidizing fluid; and

reacting the oxidizing fluid ~~within~~ the first ~~portion of the part of the formation~~section to generate heat and raise the temperature of the first ~~portion~~section.

5246. (amended) The method of claim 5214, wherein heating the second section~~portion~~ of the ~~part of the formation to~~the temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid ~~into to~~ the formation through a wellbore;

transporting the oxidizing fluid substantially by convection ~~into to~~ the second ~~portion of the part of the formation~~section, wherein the second ~~portion of the part of the formation~~section is at a temperature sufficient to support an oxidation reaction with the oxidizing fluid; and

reacting the oxidizing fluid ~~within in~~ the second ~~portion of the part of the formation~~section to generate heat and raise the temperature of the second ~~portion~~section.

5247. (amended) The method of claim 5214, wherein at least one of the ~~one or more~~ heat sources comprises an electrical heater disposed in the formation.

5248. (amended) The method of claim 5214, wherein at least one of the ~~one or more~~ heat sources comprises a natural distributor combustor.

5249. (amended) The method of claim 5214, wherein the ~~one or more~~ heat sources comprise one or more heater wells, wherein at least one of the heater well wells comprises a conduit disposed ~~within in~~ the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5250. (amended) The method of claim 5214, wherein heating the first ~~portion~~section of the part of the formation to ~~a the~~ temperature sufficient to allow synthesis gas generation and providing ~~a the~~ first synthesis gas generating fluid to the first ~~portion of the part of the formation~~section comprises introducing steam ~~into to~~ the first ~~portion~~section.

5251. (amended) The method of claim 5214, wherein heating the second ~~portion of the part of the formation~~section to ~~a the~~ temperature sufficient to allow synthesis gas generation and providing ~~a the~~ second synthesis gas generating fluid to the second ~~portion of the part of the formation~~section comprises introducing steam ~~into to~~ the second ~~portion~~section.

5252. (amended) The method of claim 5214, further comprising controlling the heating of the first ~~portion of part of the formation~~section and provision of the first synthesis gas generating

fluid to maintain a temperature ~~within~~in the first ~~portion of the part of the formation~~section above the temperature sufficient to generate synthesis gas.

5253. (amended) The method of claim 5214, further comprising controlling the heating of the second ~~portion of part of the formation~~section and provision of the second synthesis gas generating fluid to maintain a temperature ~~within~~in the second ~~portion of the part of the formation~~section above the temperature sufficient to generate synthesis gas.

5259. (amended) The method of claim 5258, wherein a portion of the carbon dioxide ~~within~~in the first synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5261. (amended) The method of claim 5260, wherein a portion of the carbon dioxide ~~within~~in the second synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5263. (amended) The method of claim 5262, wherein a portion of the carbon dioxide ~~within~~in the first synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5265. (amended) The method of claim 5264, wherein a portion of the carbon dioxide ~~within~~in the second synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5266. (amended) The method of claim 5214, wherein providing the first synthesis gas generating fluid to the first ~~portion of the part of the formation~~section comprises raising a water table of the formation to allow water to flow ~~into~~to the first ~~portion of the part of the formation~~section.

5267. (amended) The method of claim 5214, wherein providing the second synthesis gas generating fluid to the second ~~portion of the part of the formation~~section comprises raising a water table of the formation to allow water to flow ~~into~~to the second ~~portion of the part of the formation~~section.

5268. (amended) The method of claim 5214, wherein the first synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons are subjected to a reaction ~~within~~in the first ~~portion of the part of the formation~~section to increase a H₂ concentration ~~within~~in the produced first synthesis gas.

5270. (amended) The method of claim 5214, wherein the first synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react ~~within~~in the first ~~portion of the part of the formation~~section to increase an energy content of the produced first synthesis gas.

5271. (amended) The method of claim 5214, wherein the second synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react ~~within~~in at least the second ~~portion of the part of the formation~~section to increase an energy content of the second produced synthesis gas.

5272. (amended) The method of claim 5214, further comprising maintaining a pressure ~~within~~in the formation during synthesis gas generation, and passing produced blended synthesis gas through a turbine to generate electricity.

5276. (amended) The method of claim 5214, further comprising using a portion of the first synthesis gas as a combustion fuel for ~~the one or more~~ of the heat sources.

5277. (amended) The method of claim 5214, further comprising using a portion of the second synthesis gas as a combustion fuel for ~~the one or more~~ of the heat sources.

5278. (amended) The method of claim 5214, further comprising using a portion of the blended synthesis gas as a combustion fuel for ~~the one or more~~ of the heat sources.

5279. (amended) A method of treating a coal formation in situ, comprising:
~~—providing heat from heaters to at least a portion of the formation;~~

allowing ~~the~~ heat to transfer from ~~the one or more~~ heaters to a part of the formation such that the heat from ~~the one or more~~ of the heaters pyrolyzes ~~at least a portion of some~~ hydrocarbon material ~~within~~ in the part of the formation;

producing pyrolysis products from the formation;

heating a first ~~portion~~ section of ~~a the~~ formation with one or more of the heaters to a temperature sufficient to allow generation of synthesis gas;

providing a first synthesis gas generating fluid to the first ~~portion~~ section to generate a first synthesis gas;

removing a portion of the first synthesis gas from the formation;

heating a second ~~portion~~ section of a formation with one or more of the heaters to a temperature sufficient to allow generation of synthesis gas having a H₂ to CO ratio greater than a H₂ to CO ratio of the first synthesis gas;

providing a second synthesis gas generating ~~component~~ fluid to the second ~~portion~~ section to generate a second synthesis gas;

removing a portion of the second synthesis gas from the formation; and

blending a portion of the first synthesis gas with a portion of the second synthesis gas to produce a blended synthesis gas having a selected H₂ to CO ratio.

5280. (amended) The method of claim 5279, ~~wherein the one or more heaters comprise at least two heaters, and~~ wherein superposition of heat from at least ~~the two~~ of the heaters pyrolyzes at least some hydrocarbons ~~within~~ in the part of the formation.

5281. (amended) The method of claim 5279, wherein the first synthesis gas generating fluid and the second synthesis gas generating fluid comprise ~~the same component~~ carbon dioxide.

5282. (amended) The method of claim 5279, further comprising controlling the temperature in the first ~~portion~~ section to control a composition of the first synthesis gas.

5283. (amended) The method of claim 5279, further comprising controlling the temperature in the second ~~portion~~ section to control a composition of the second synthesis gas.

5294. (amended) The method of claim 5279, wherein removing a portion of the second synthesis gas comprises withdrawing second synthesis gas through a production well, wherein a temperature of the production well adjacent to a ~~second synthesis gas~~ production zone of the second synthesis gas is maintained at a substantially constant temperature such that the H₂ to CO ratio of the second synthesis gas is configured to produce second synthesis gas having the H₂ to CO ratio greater than the H₂ to CO ratio of the first synthesis gas.

5295. (amended) The method of claim 5279, wherein the first synthesis gas producing fluid comprises CO₂ and wherein the temperature of the first ~~portion-section~~ is at a temperature that will result in conversion of CO₂ and carbon from the first ~~portion-section~~ to CO to generate a CO rich first synthesis gas.

5296. (amended) The method of claim 5279, wherein the second synthesis gas producing fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons react within-in the formation to increase a H₂ concentration within-in the produced second synthesis gas.

5298. (amended) The method of claim 5279, further comprising removing an excess of first synthesis gas from the first ~~portion-section~~ to have an excess of CO, subjecting the first synthesis gas to a shift reaction to reduce an amount of CO and increase an amount of H₂ before blending the first synthesis gas with the second synthesis gas.

5302. (amended) The method of claim 5279, further comprising generating electricity from the blended synthesis gas using a fuel cell, separating carbon dioxide from a fluid exiting the fuel cell, and storing a portion of the separated carbon dioxide within-in a spent ~~portion-section~~ of the formation.

5304. (amended) The method of claim 5279, ~~further comprising~~ wherein allowing the heat to transfer from the ~~one or more~~ heaters to the part of the formation ~~to substantially uniformly increase-increases~~ a permeability of a majority of the part of the formation such that the permeability of the majority of the part is substantially uniform.

5305. (amended) The method of claim 5279, ~~further comprising controlling wherein allowing~~
~~the heat to transfer from the one or more heaters~~ increases a permeability of a majority of the part
~~to produce a permeability within the part of the formation of greater than about 100 millidarcy.~~

5306. (amended) The method of claim 5279, further comprising heating ~~at least the portion of~~
~~the part of the formation~~ the first section when providing the first synthesis gas generating fluid to
inhibit temperature decrease ~~within~~ in the first section ~~part of the formation~~ during synthesis gas
generation.

5307. (amended) The method of claim 5279, wherein the temperature sufficient to allow
synthesis gas generation is ~~within~~ in a range from approximately 400 °C to approximately 1200
°C.

5308. (amended) The method of claim 5279, wherein heating the first ~~a portion of the part of~~
~~the formation~~ section to ~~a~~ the temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more of the heaters with heaters disposed in
the wellbores, wherein the heaters disposed in the wellbores are configured to raise temperatures
of the zones to temperatures sufficient to support reaction of hydrocarbon material ~~within~~ in the
zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material
~~within~~ in the zones to produce heat in the zones; and

transferring heat from the zones to the ~~part of the formation~~ first section.

5309. (amended) The method of claim 5279, wherein heating the second ~~portion of the part of~~
~~the formation~~ section to ~~a~~ the temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more of the heaters with heaters disposed in
the wellbores, wherein the heaters disposed in the wellbores are configured to raise temperatures
of the zones to temperatures sufficient to support reaction of hydrocarbon material ~~within~~ in the
zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;
allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material ~~within~~in the zones to produce heat in the zones; and
transferring heat from the zones to the ~~part of the formation~~second section.

5310. (amended) The method of claim 5279, wherein heating the first ~~portion of the part of the formation~~section to a ~~the~~ temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid ~~into~~to the formation through a wellbore;
transporting the oxidizing fluid substantially by convection ~~into~~to the first ~~portion of the part of the formation~~section, wherein the first ~~portion of the part of the formation~~section is at a temperature sufficient to support an oxidation reaction with the oxidizing fluid; and
reacting the oxidizing fluid ~~within~~in the first ~~portion of the part of the formation~~section to generate heat and raise the temperature of the first ~~portion~~section.

5311. (amended) The method of claim 5279, wherein heating the second ~~portion of the part of the formation~~section to a ~~the~~ temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid ~~into~~to the formation through a wellbore;
transporting the oxidizing fluid substantially by convection ~~into~~to the second ~~portion of the part of the formation~~section, wherein the second ~~portion of the part of the formation~~section is at a temperature sufficient to support an oxidation reaction with the oxidizing fluid; and
reacting the oxidizing fluid ~~within~~in the second ~~portion of the part of the formation~~section to generate heat and raise the temperature of the second ~~portion~~section.

5312. (amended) The method of claim 5279, wherein at least one of the ~~one or more~~ heaters comprises an electrical heater disposed in the formation.

5313. (amended) The method of claim 5279, wherein at least one of the ~~one or more~~ heaters comprises a natural distributor combustor.

5314. (amended) The method of claim 5279, wherein the ~~one or more~~ heaters comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed ~~within~~in the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

5315. (amended) The method of claim 5279, wherein heating the first ~~portion of the part of the formation~~section to a ~~the~~ temperature sufficient to allow synthesis gas generation and providing a ~~the~~ first synthesis gas generating fluid to the first ~~portion of the part of the formation~~section comprises introducing steam ~~into~~to the first ~~portion~~section.

5316. (amended) The method of claim 5279, wherein heating the second ~~portion of the part of the formation~~section to a ~~the~~ temperature sufficient to allow synthesis gas generation and providing a ~~the~~ second synthesis gas generating fluid to the second ~~portion of the part of the formation~~section comprises introducing steam ~~into~~to the second ~~portion~~section.

5317. (amended) The method of claim 5279, further comprising controlling the heating of the first ~~portion of part of the formation~~section and provision of the first synthesis gas generating fluid to maintain a temperature ~~within~~in the first ~~portion of the part of the formation~~section above the temperature sufficient to generate synthesis gas.

5318. (amended) The method of claim 5279, further comprising controlling the heating of the second ~~portion of part of the formation~~section and provision of the second synthesis gas generating fluid to maintain a temperature ~~within~~in the second ~~portion of the part of the formation~~section above the temperature sufficient to generate synthesis gas.

5324. (amended) The method of claim 5323, wherein a portion of the carbon dioxide ~~within~~in the first synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5326. (amended) The method of claim 5325, wherein a portion of the carbon dioxide ~~within~~in the second synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5328. (amended) The method of claim 5327, wherein a portion of the carbon dioxide ~~within~~in the first synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5330. (amended) The method of claim 5329, wherein a portion of the carbon dioxide ~~within~~in the second synthesis gas generating fluid comprises carbon dioxide removed from the formation.

5331. (amended) The method of claim 5279, wherein providing the first synthesis gas generating fluid to the first ~~portion of the part of the formation~~section comprises raising a water table of the formation to allow water to flow ~~into~~to the first ~~portion of the part of the formation~~section.

5332. (amended) The method of claim 5279, wherein providing the second synthesis gas generating fluid to the second ~~portion of the part of the formation~~section comprises raising a water table of the formation to allow water to flow ~~into~~to the second ~~portion of the part of the formation~~section.

5333. (amended) The method of claim 5279, wherein the first synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons are subjected to a reaction ~~within~~in the first ~~portion of the part of the formation~~section to increase a H₂ concentration ~~within~~in the produced first synthesis gas.

5335. (amended) The method of claim 5279, wherein the first synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react ~~within~~in the first ~~portion of the part of the formation~~section to increase an energy content of the produced first synthesis gas.

5336. (amended) The method of claim 5279, wherein the second synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react ~~within~~in at least the second ~~portion of the part of the formation~~section to increase an energy content of the second produced synthesis gas.

5337. (amended) The method of claim 5279, further comprising maintaining a pressure ~~within~~ in the formation during synthesis gas generation, and passing produced blended synthesis gas through a turbine to generate electricity.

5341. (amended) The method of claim 5279, further comprising using a portion of the first synthesis gas as a combustion fuel for ~~the~~ one or more of the heaters.

5342. (amended) The method of claim 5279, further comprising using a portion of the second synthesis gas as a combustion fuel for ~~the~~ one or more of the heaters.